Chapter 2

Retail Motor-Fuel Systems

Chapter 2 Objectives

Upon completion be able to define

- motor fuel
- motor fuel device
- retail device

Chapter 2 Objectives continued

- Identify components and features
  - functional components
  - standard features
- Differentiate between
  - self-contained dispenser
  - remote dispenser
- Describe differences between
  - single-product
  - blended-product
- Recognize features of electronic dispensing systems

Chapter 2 Definitions

- **motor-fuel.** Liquid fuel for internal-combustion engines.
- **motor-fuel device** or **motor-fuel dispenser** or **retail motor-fuel device.** A device for measuring and delivering liquid fuel. The term "motor-fuel dispenser" means the same as "motor-fuel device"; the term "retail motor fuel device" applies to a unique category of device (see definition of "retail device").

Definitions continued

Retail device. A device for:

- single deliveries of less than 378 L (100 gal),
- retail deliveries of motor fuels to individual highway vehicles, or
- single deliveries of liquefied petroleum gas for domestic use and liquefied petroleum gas or liquid anhydrous ammonia for nonresale use.

Figure 2-1 Basic Components of the Fuel-Dispensing System

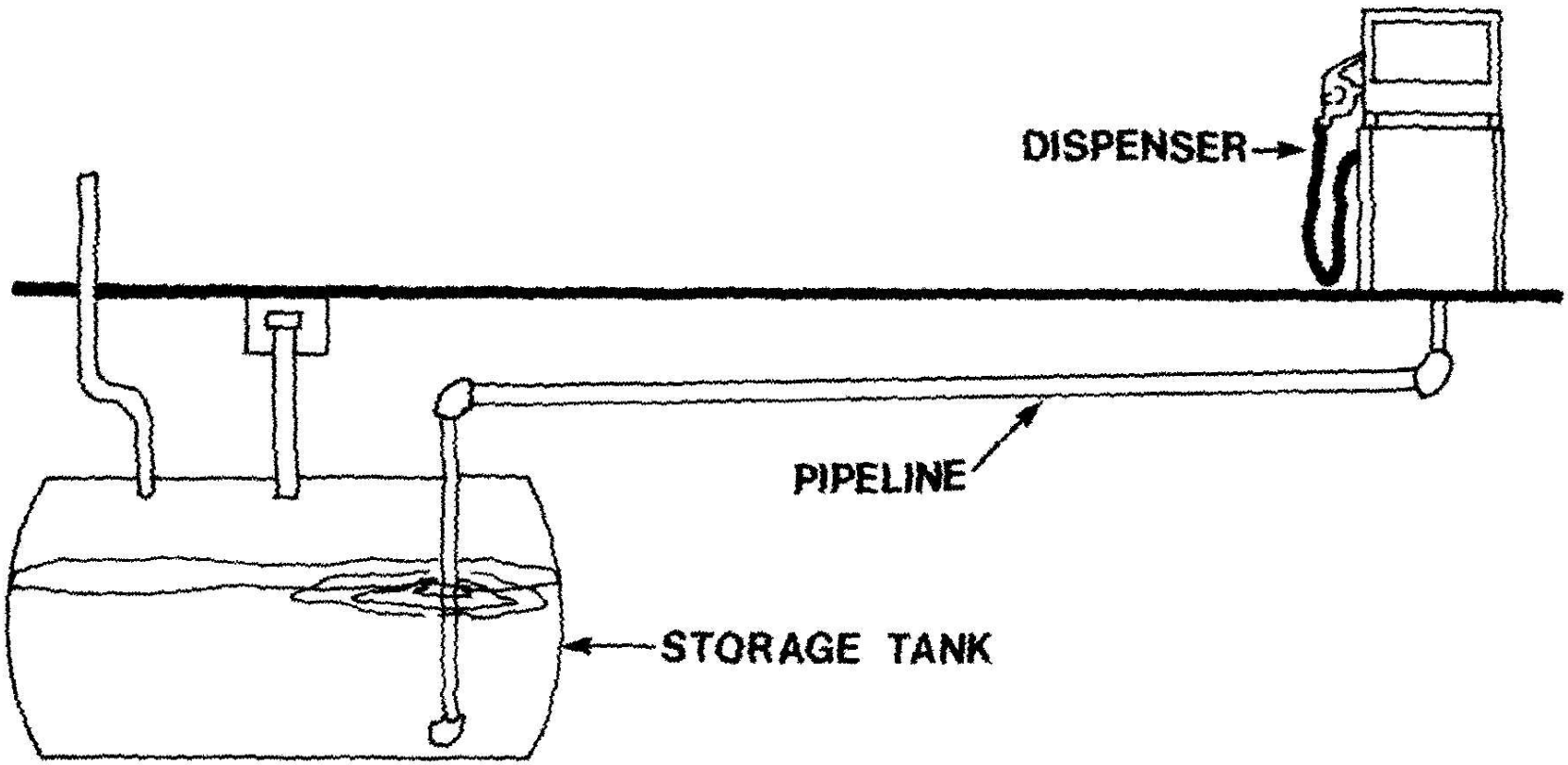


Figure 2-2. The Storage Tank

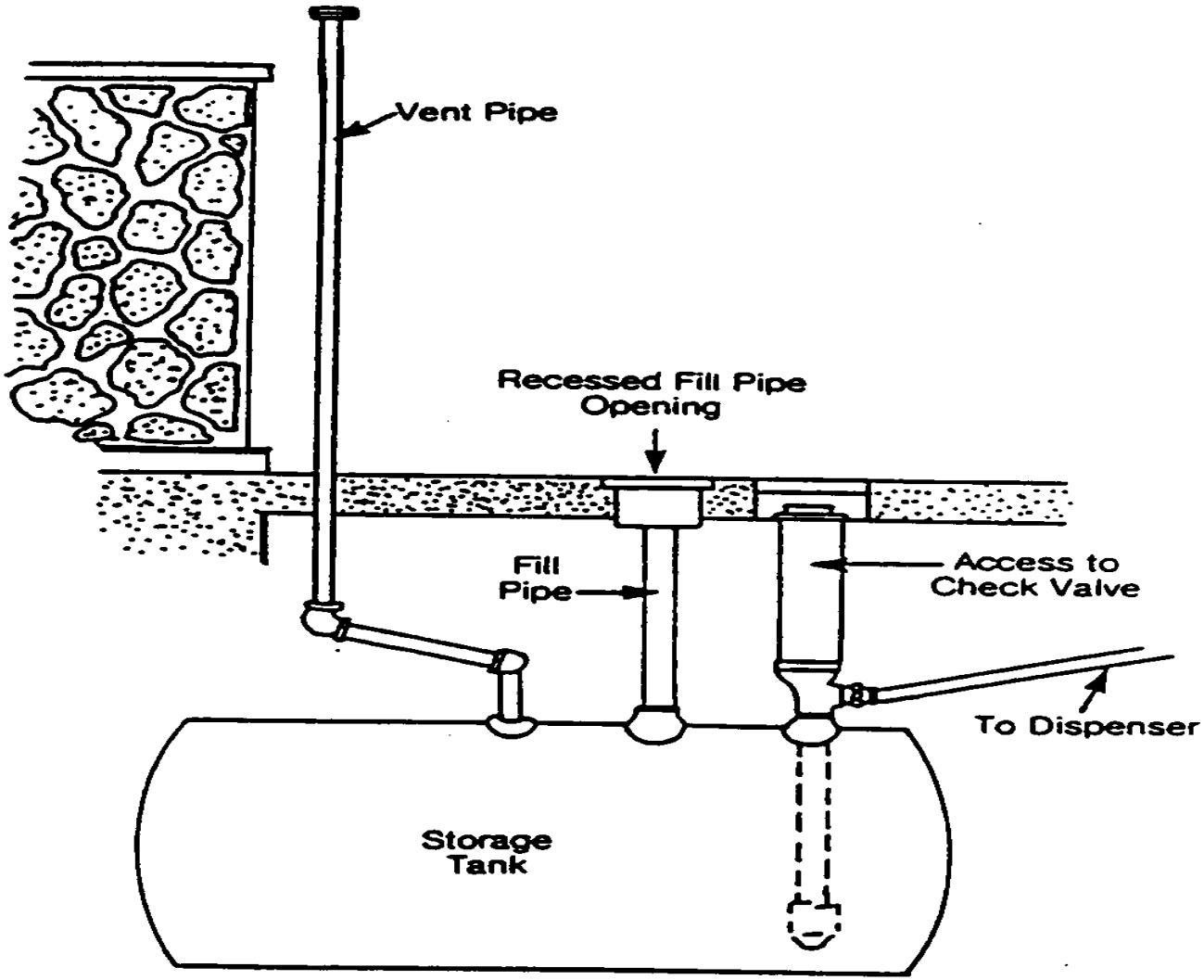
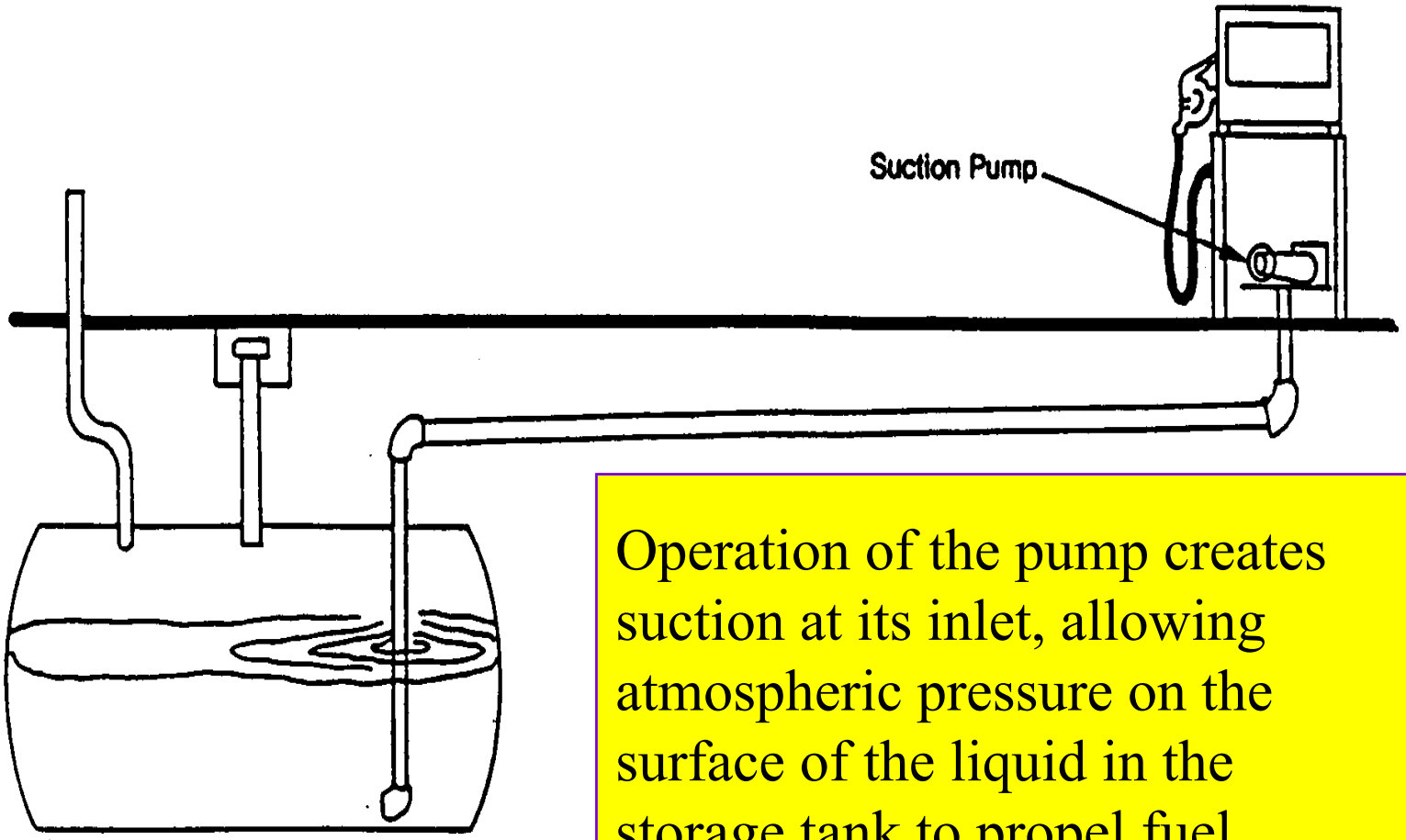


Figure 2-3. Suction-Pump System



Operation of the pump creates suction at its inlet, allowing atmospheric pressure on the surface of the liquid in the storage tank to propel fuel toward the dispenser.

Figure 2-4. Remote-Pedestal System

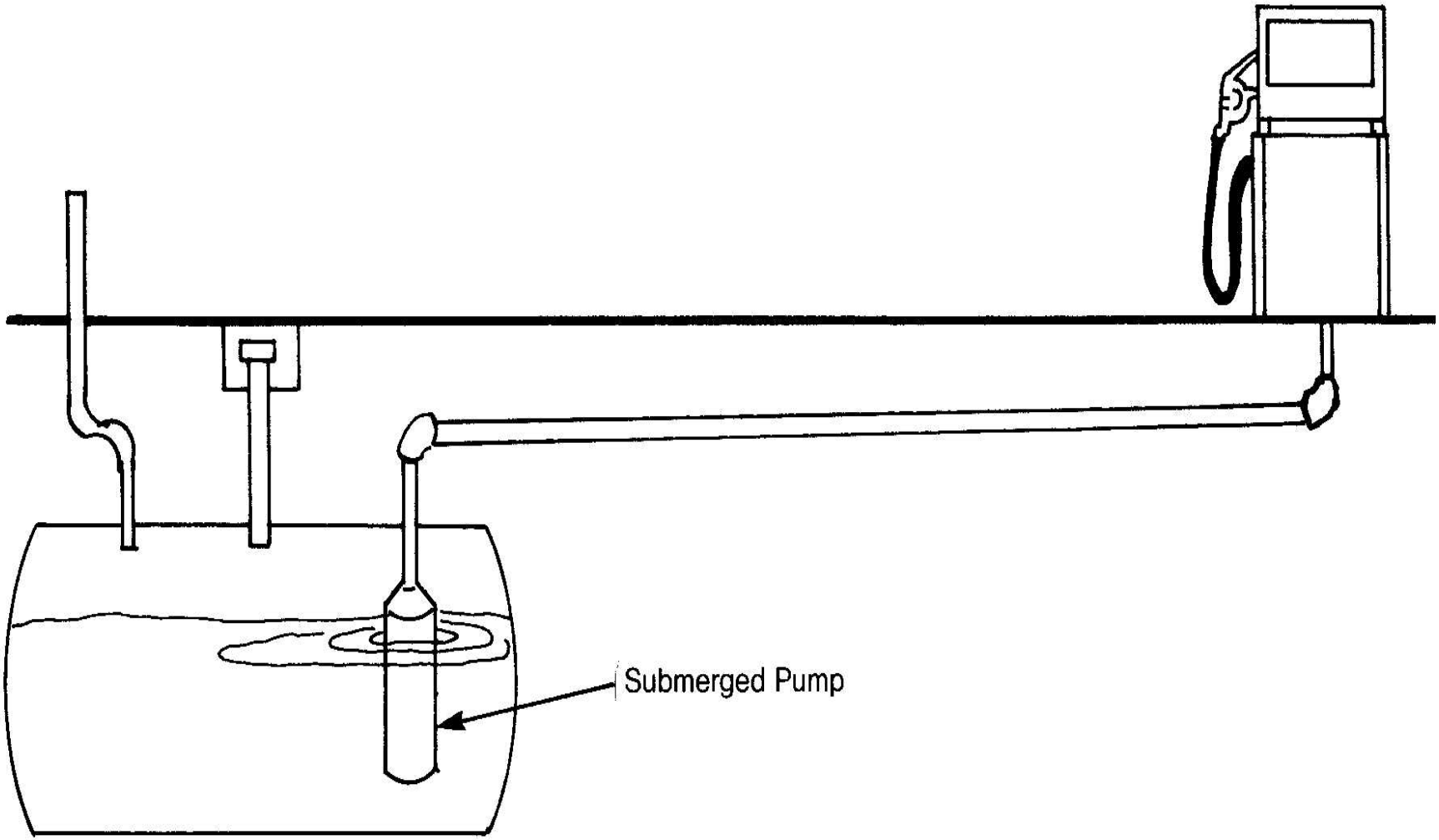
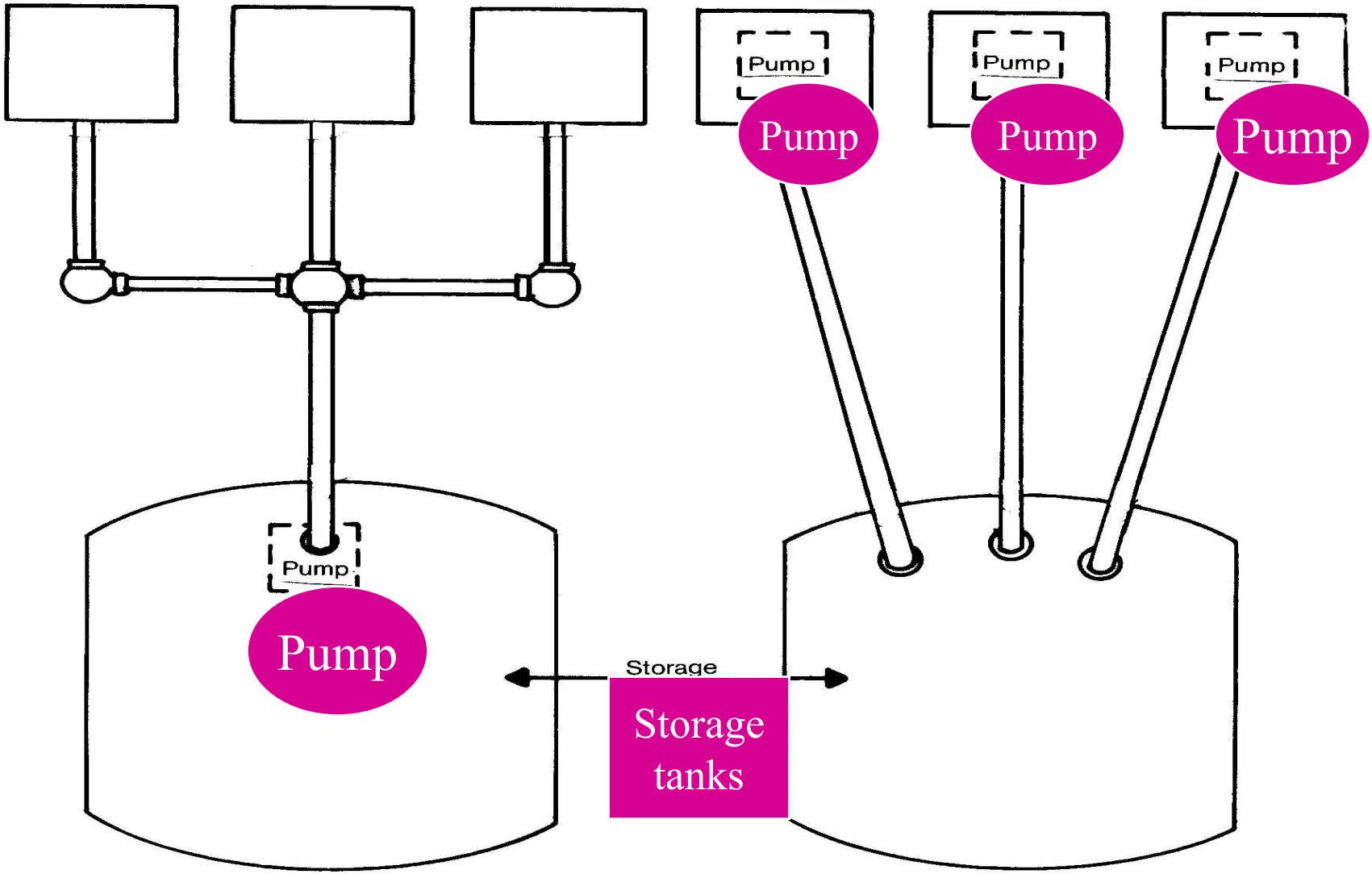
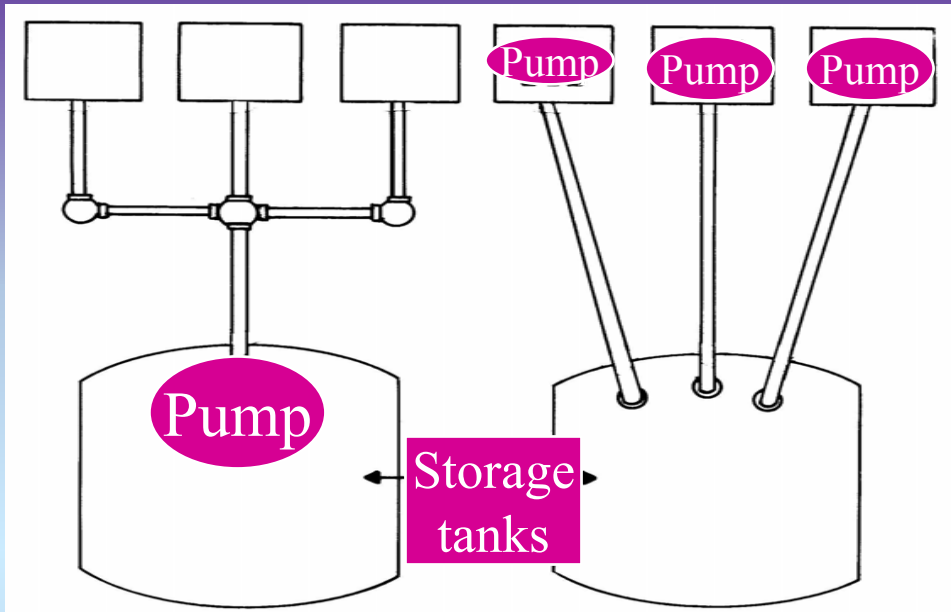


Figure 2-5. Multi-Dispenser Systems



Advantages/Disadvantages



One pump
less maintenance
less cost

If pump goes out
entire system is down

Less expensive for
only one or two pumps
per product type

If one pump goes down
others available

FIGURE 2-6. 1- AND 2-PRODUCT DUAL DISPENSERS

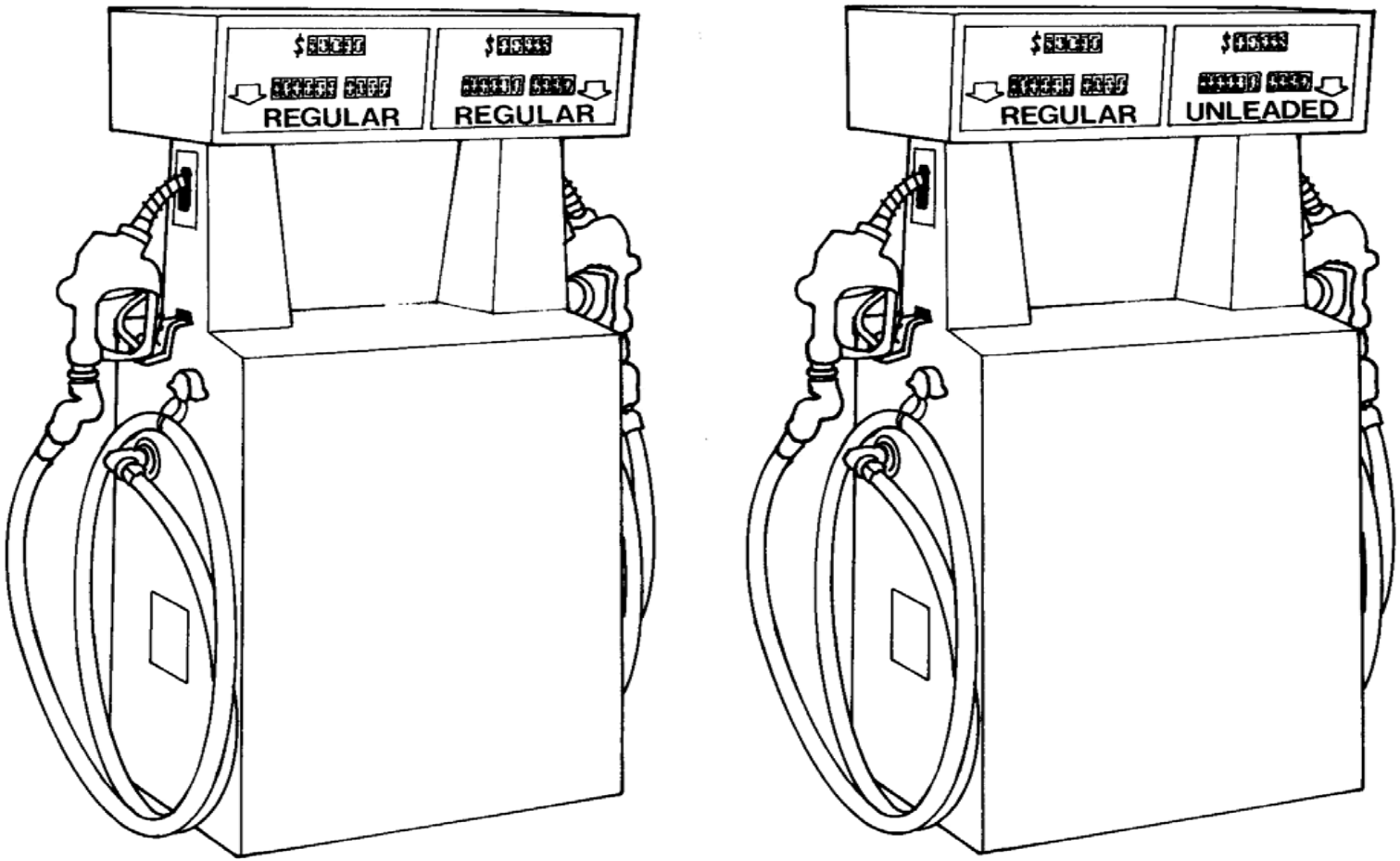
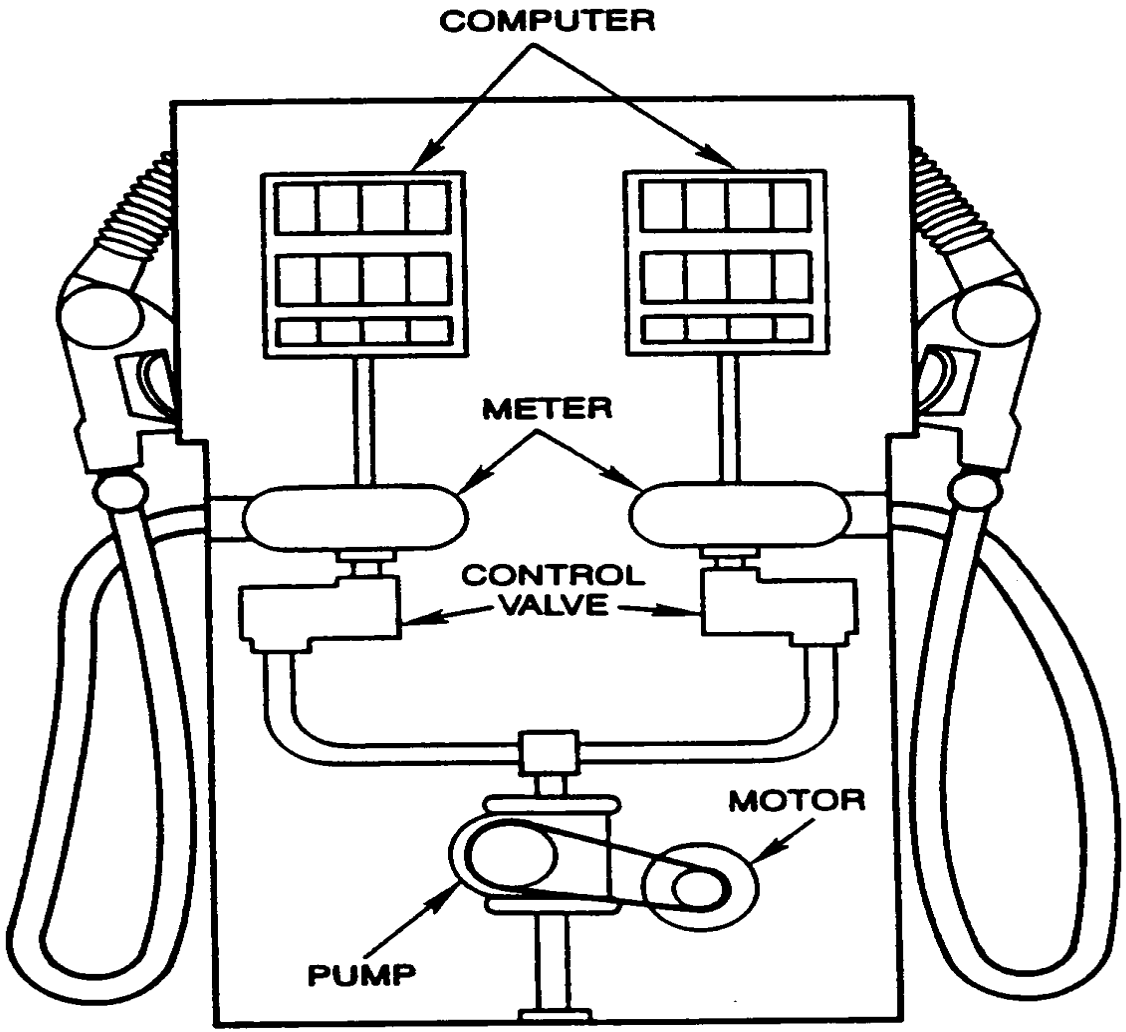
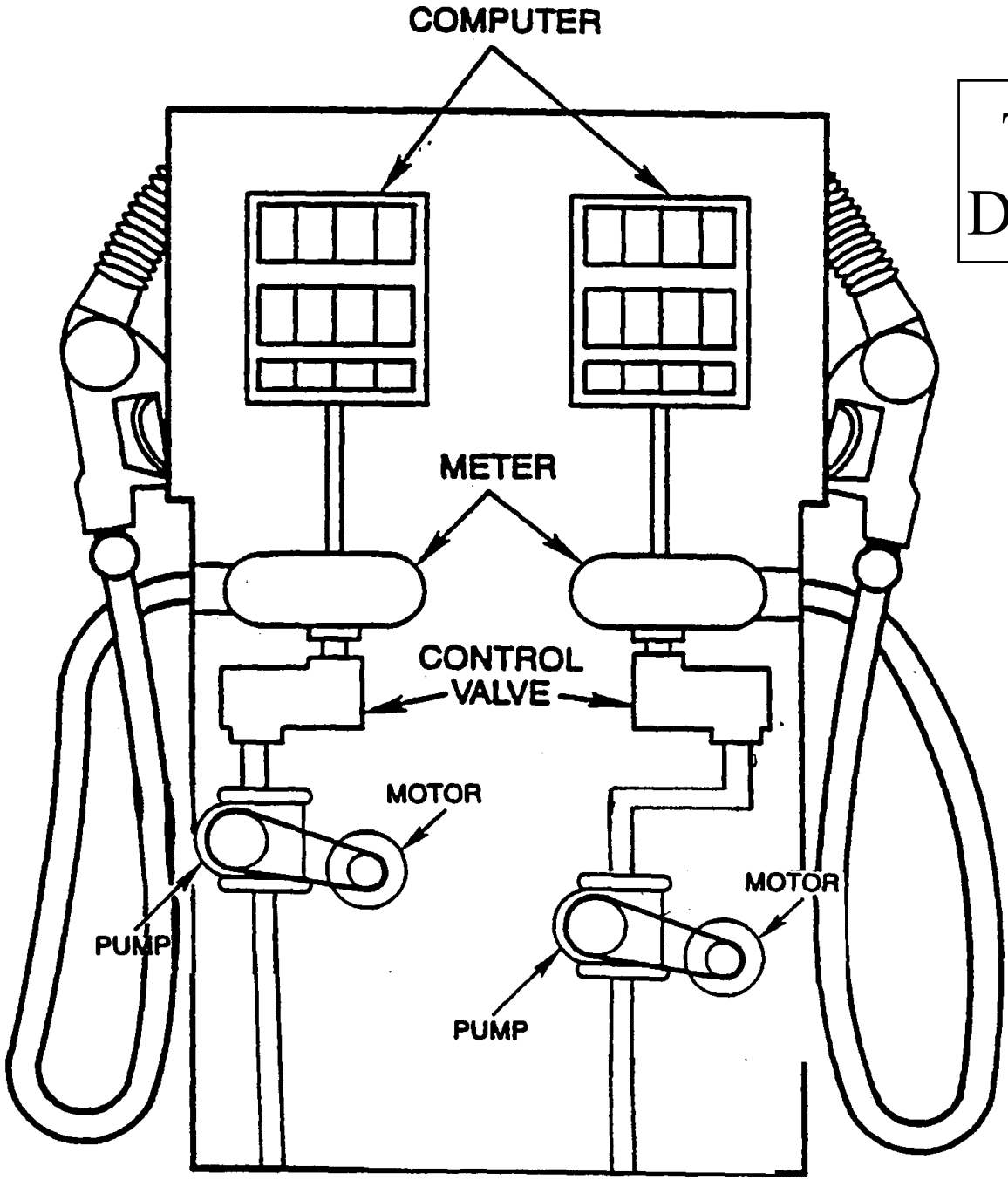


Figure 2-7. Single-Product Dual Dispenser





Two product
Dual Dispenser

Figure 2-8. Typical Dual Product Dispensers

Figure 2-9. How a Multiple Product Dispenser Works

❶ Fuel passes through a shear valve then enters the dispenser.

❷ Fuel flows through a strainer and filter.

❸ Filtered fuel passes through a two-stage solenoid and primary valve (earlier models use a check/relief valve, parallel shutoff, and slow down solenoid valves).

❹ The meter measures fuel flow.

❺ Fuel discharges through the nozzle.

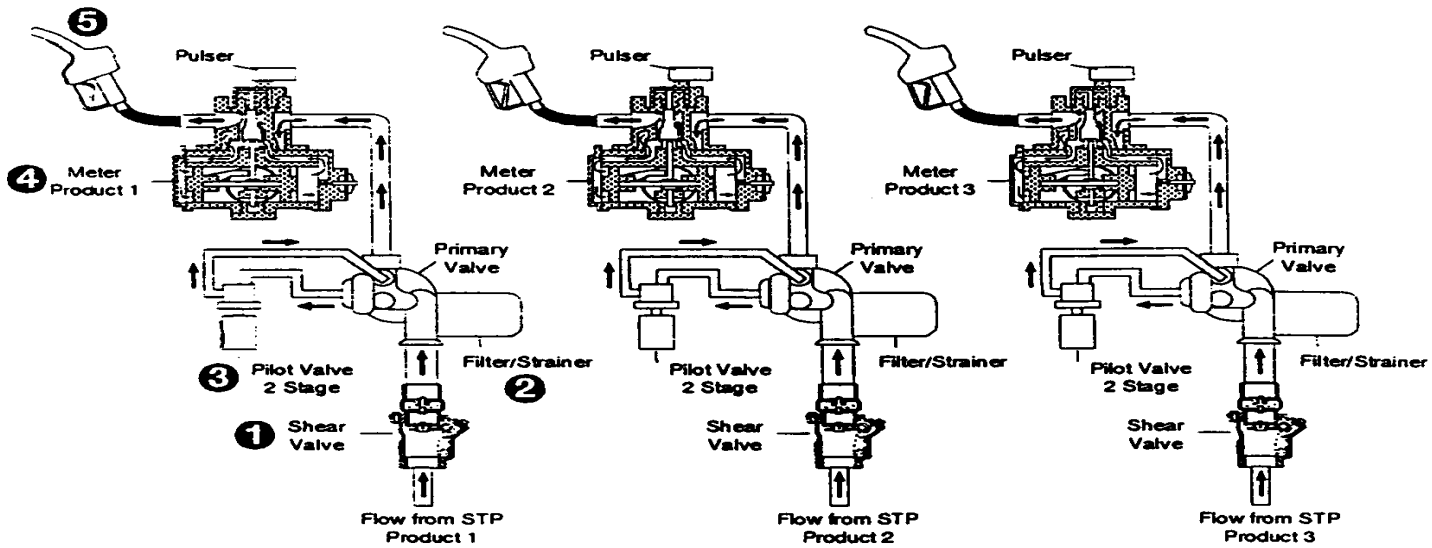


Figure 2-10 Typical Multiple-Product Dispenser Configurations

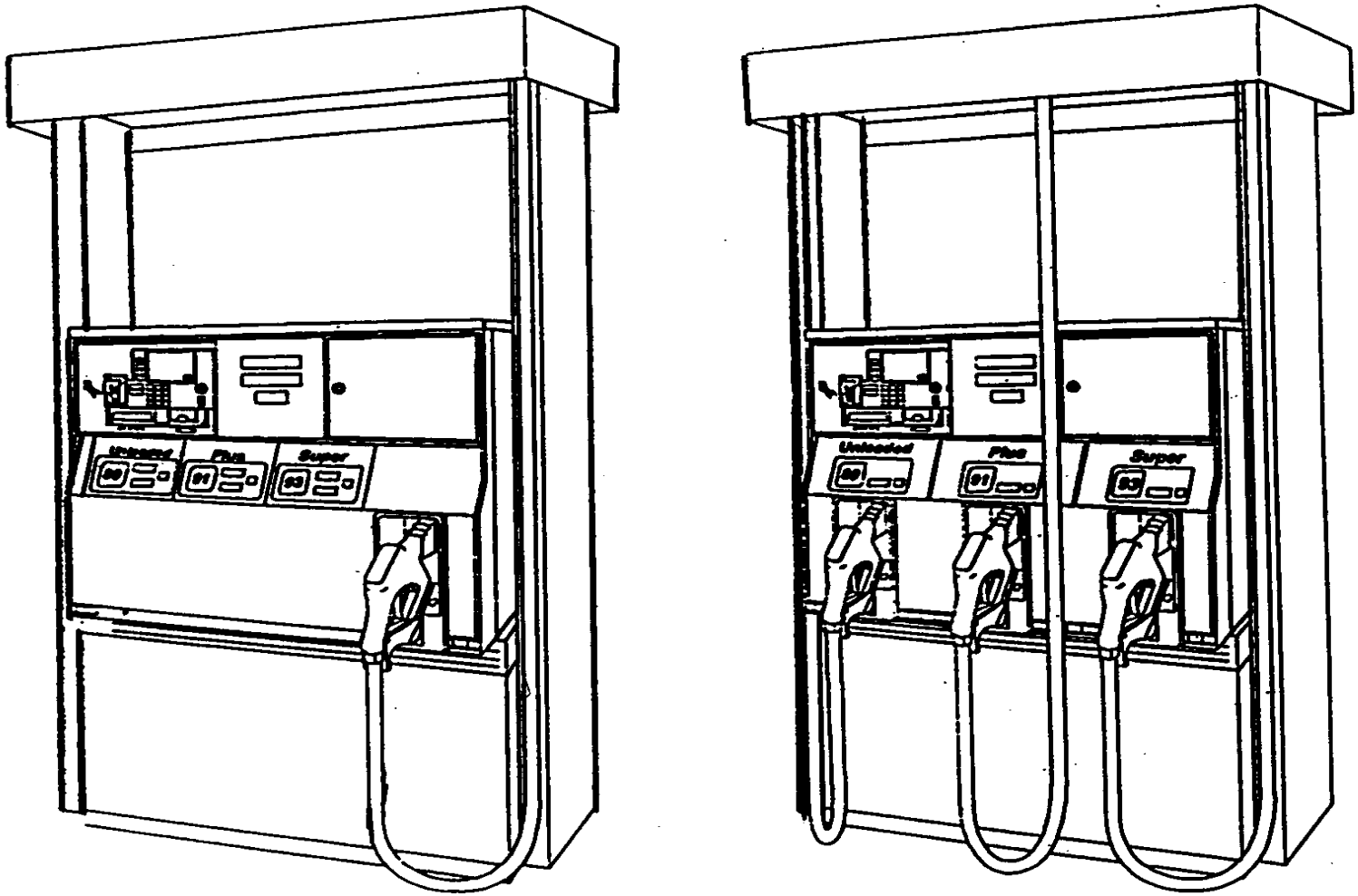


Figure 2-11. Typical Multi-Product Dispenser, External View

1

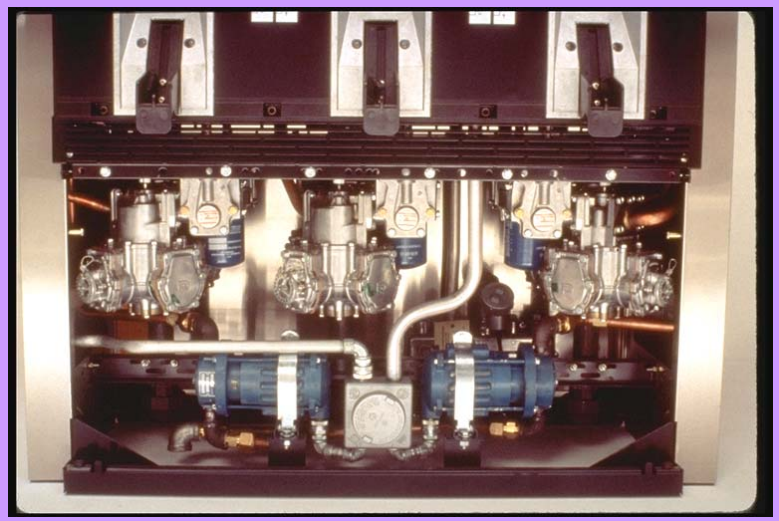
2

3

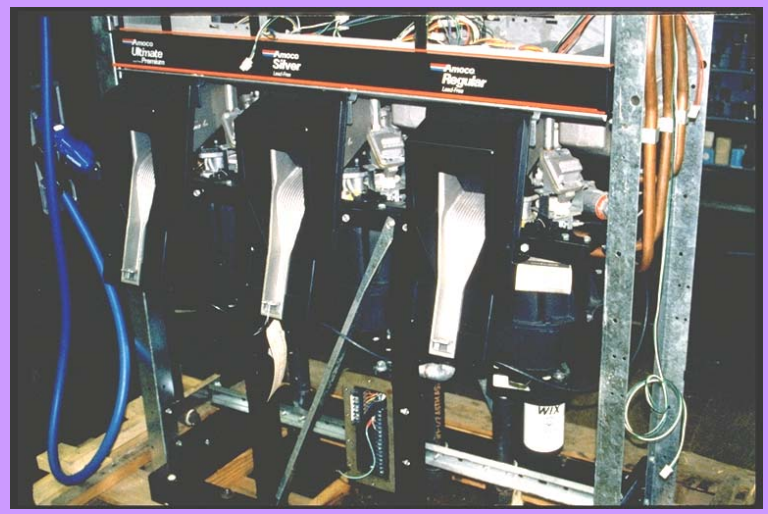
4

Figure 2-12. Typical Multi-Product Dispensers, Internal View

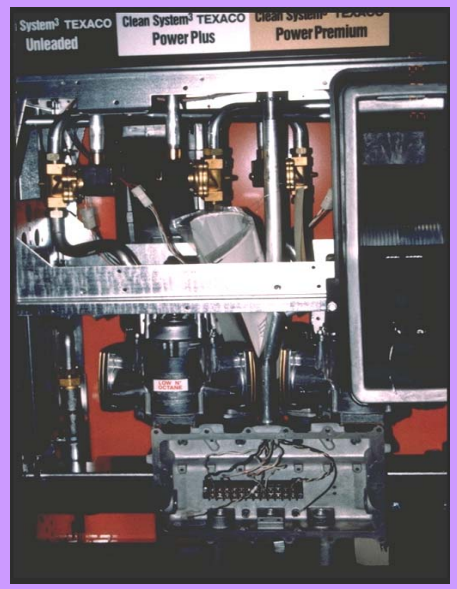
1



3



2



4

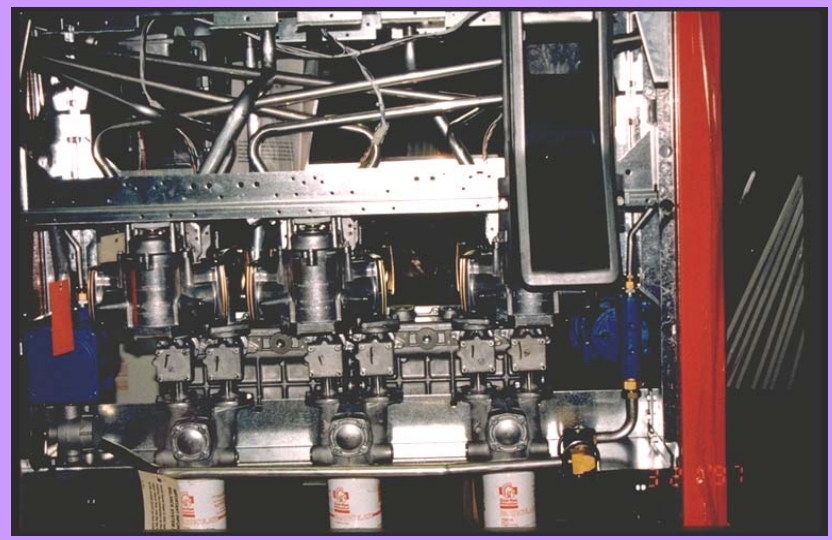


Figure 2-13 Fixed Blender

The MPD Fixed Blender uses a mechanical fixed blend valve to blend product from two separate tanks. It has two straight product nozzle positions and one blended product position.

❶ Fuel passes through a shear valve then enters dispenser.

❷ For straight product fuel flows directly to a strainer and filter.

❸ For blended product fuel flows through strainer/check valve assemblies. These assemblies clean fuel and prevent tank cross flow.

❹ Fuel enters blend valve through inlet A and B.

❺ The orifices and equalizing piston control flow from each tank. The orifice combination maintains the fixed blend ratio.

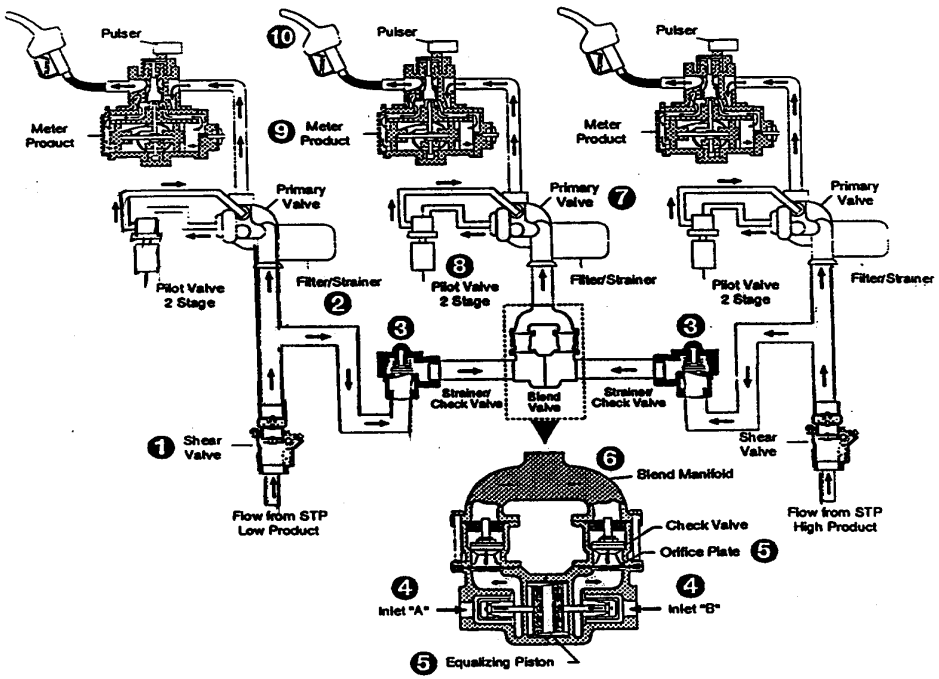
❻ The fixed ratio fuel flow passes through check valves then mixes in the blend manifold.

❼ Straight product and blended product pass through the filter and strainer assembly.

❽ Filtered fuel passes through a primary valve controlled by a two-stage pilot valve.

❾ The meter measures fuel flow.

❿ Fuel discharges through the nozzle.



The MPD Fixed Blender uses a mechanical fixed blend valve to blend product from two separate tanks. It has two straight product nozzle positions and one blended product position.

❶ Fuel passes through a shear valve then enters dispenser.

❷ For straight product fuel flows directly to a strainer and filter.

❸ For blended product fuel flows through strainer/check valve assemblies. These assemblies clean fuel and prevent tank cross flow.

❹ Fuel enters blend valve through inlet A and B.

❺ The orifices and equalizing piston control flow from each tank. The orifice combination maintains the fixed blend ratio.

❻ The fixed ratio fuel flow passes through check valves then mixes in the blend manifold.

❼ Straight product and blended product pass through the filter and strainer assembly.

❽ Filtered fuel passes through a primary valve controlled by a two-stage pilot valve.

❾ The meter measures fuel flow.

❿ Fuel discharges through the nozzle.

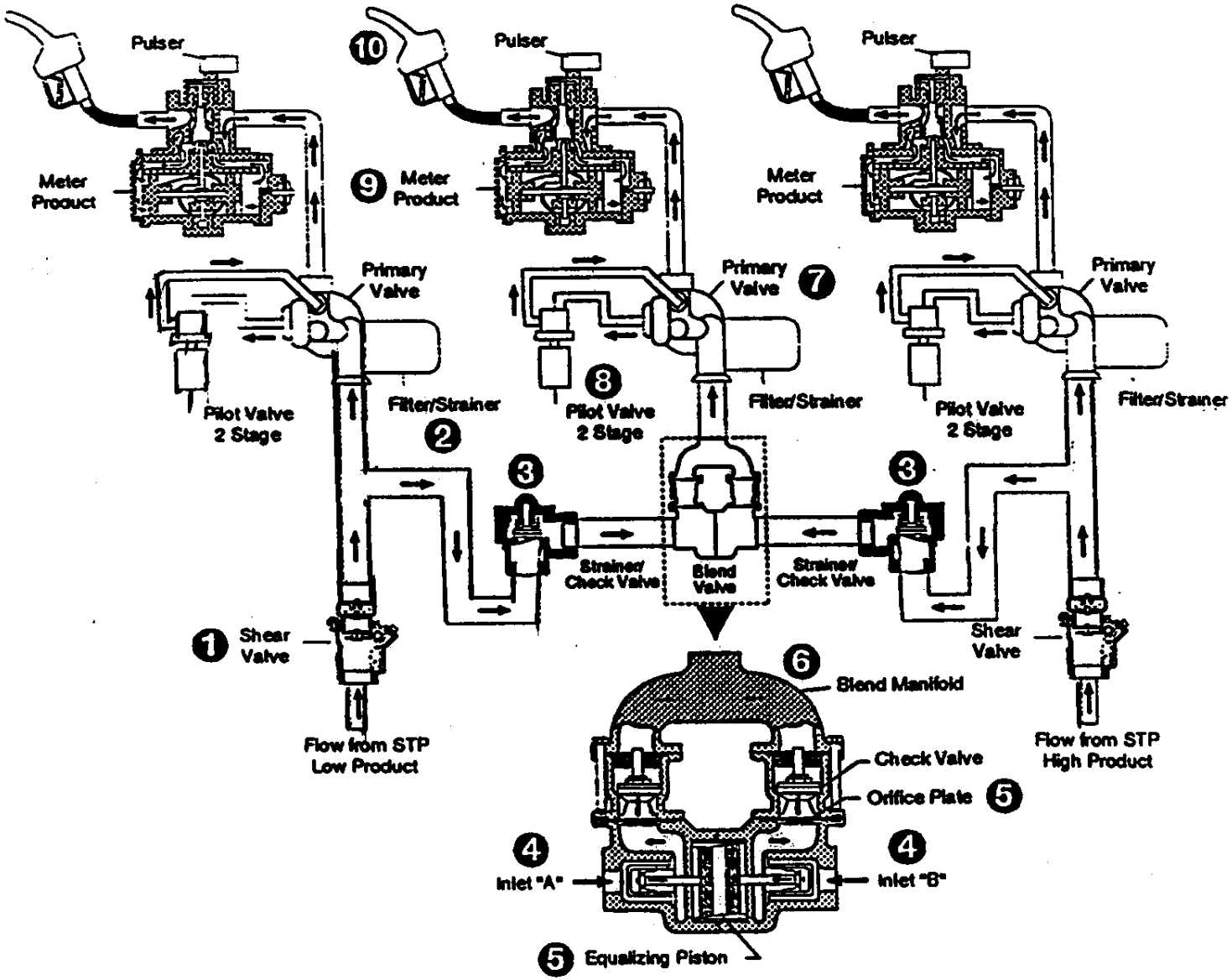

Pulser
Meter Product
Primary Valve
Pilot Valve 2 Stage
Filter/Strainer
Strainer/ Check Valve
Blend Valve
Shear Valve
Flow from STP Low Product
Flow from STP High Product
Blend Manifold
Check Valve
Orifice Plate
Inlet "A"
Inlet "B"
Equalizing Piston

Figure 2-14. Blender Hose Configuration

Figure 2-15. Blender Types

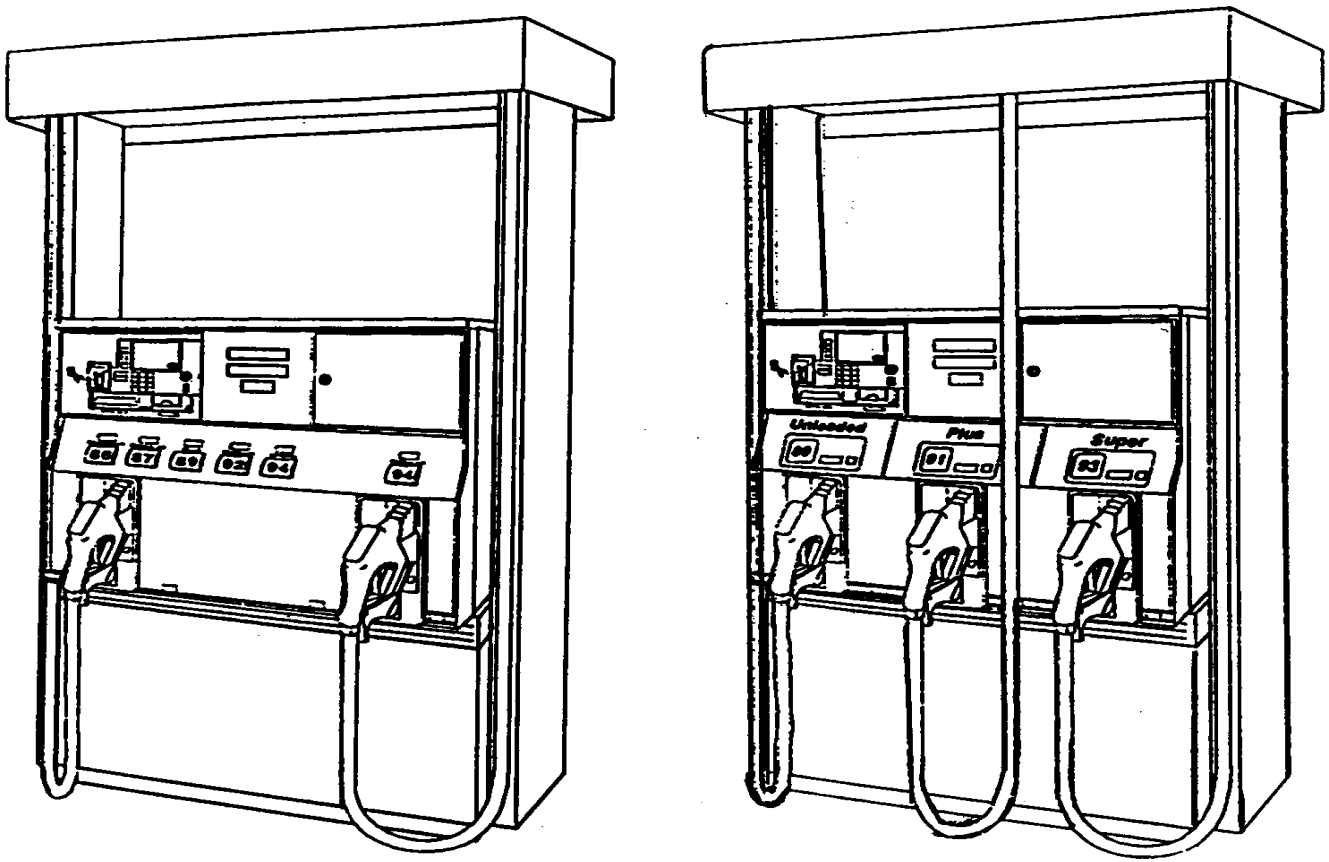
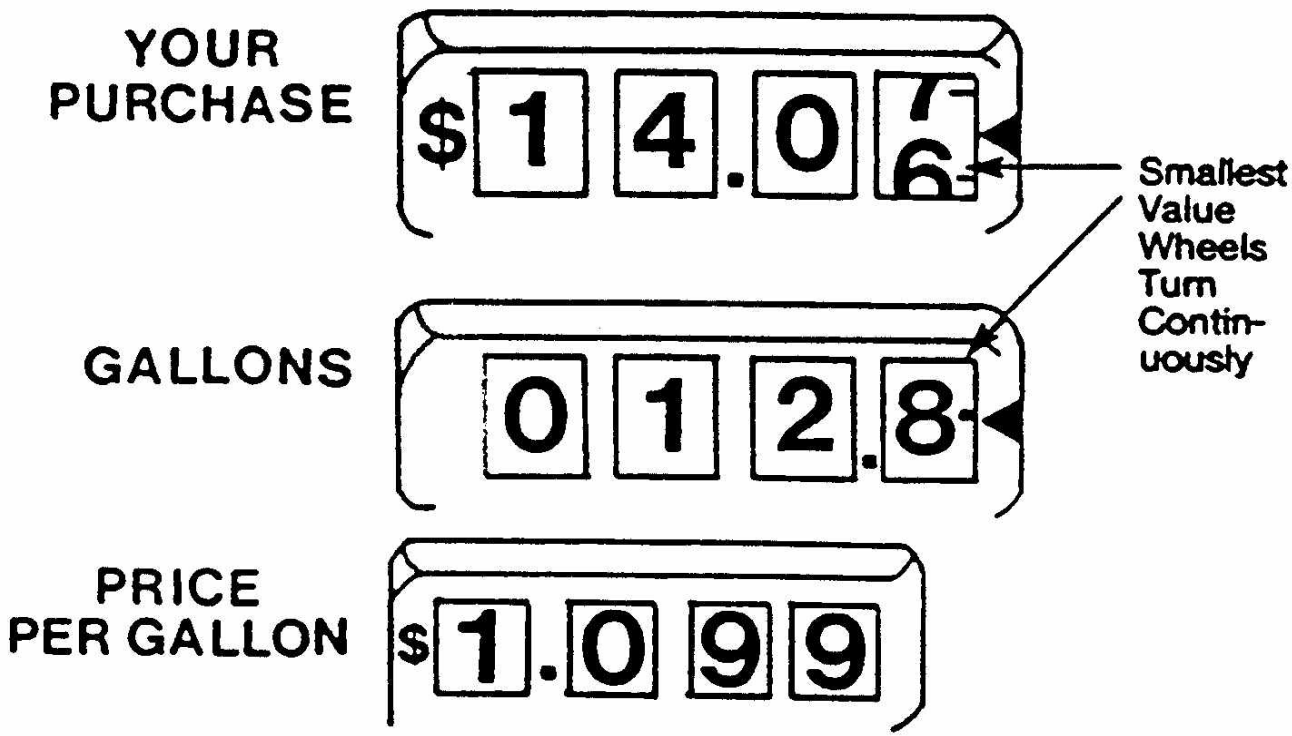


Figure 2-16 Volume and Price Indicator, Analog Indicator



analog type. A system of indication or recording in which values are presented as a series of graduations in combination with an indicator, or in which the most sensitive element of an indicating system moves continuously during the operation of the device.

Analog

- Normally Mechanical
- Continuous through-out range
- Infinite number of readings
- Graduations
- Index of indicator (pointer)
- May need to estimate reading to determine mathematical agreement

Figure 2-17 Volume and Price Indicators, Electronic Digital Indicator

digital type. A system of indication or recording of the selector type or one that advances intermittently in which all values are presented digitally, or in numbers. In a digital indicating or recording element, or in digital representation, there are no graduations.

Digital

- Moves in discrete steps
- Rounds intermediate values
- No graduations
- No index of indicator
- Easier to determine mathematical agreement

Summary

Upon completion be able to define

- motor fuel
- motor fuel device
- retail device

Summary (cont)

- Identify components and features
  - functional components
  - standard features
- Differentiate between
  - self-contained dispenser
  - remote dispenser
- Describe differences between
  - single-product
  - blended-product
- Recognize features of electronic dispensing systems